

# The Significance of Clay Rollers of the Ban Chiang Culture, Thailand

*Received 1 December 1980*

WILLIAM J. FOLAN AND BURMA H. HYDE

CLAY OBJECTS from the upper zones of the prehistoric village site of Ban Chiang, Thailand and environs and similar rollers from Non Nok Tha (Solheim, personal communication) and Kampuchea (Cambodia) (Mansuy 1902:20) dating from approximately 1600 B.C. (Higham 1979:674) have usually been identified as rollers used to decorate textiles with colored designs (Charoenwongsa 1973: Fig. 8; Kanchanagama 1975; Gorman and Charoenwongsa 1976:22, 23; Van Esterik and Kress 1978) (Plates I and II). Additionally, these rollers have been interpreted to be amulets worn in certain ritual contexts as well as being indicators of personal accomplishment such as success in trading, military, or other high status activities (Van Esterik and Kress 1978:55).

The purpose of this paper is to offer an alternative interpretation for the use of these clay artifacts based on studies of similar artifacts from such places as Iran, the southeastern United States, and California that are thought to represent ideographic tokens (Schmandt-Besserat 1977; Webb 1977; Hyde and Folan 1980; Folan and Hyde n.d.) (Plate III, Figs. 1 and 2).

## BAN CHIANG

The clay artifacts from Ban Chiang are approximately 3–10 cm long by 2.5–4 cm in diameter. They appear to be hand molded, mostly convex cylinders finally shaped while leather-hard to form either a series of narrow disks or lower relief designs before being fired to a high degree of hardness. In at least two cases (Plate I) the clay objects appear to

When their article was submitted, the authors were both affiliated with the Division of Social Sciences, University of Texas at San Antonio. William J. Folan is presently Director, Centro de Investigaciones Historicas y Sociales, Universidad Autonoma del Sudeste, Campeche, Cam., Mexico. Revised manuscript received January 1981.

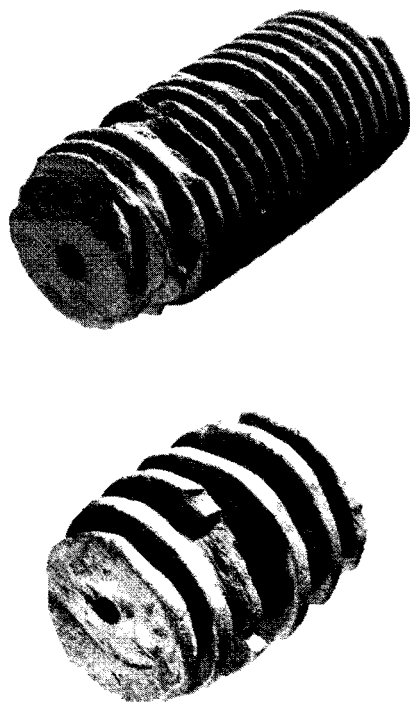


Plate I Two baked clay artifacts collected in Ban Chiang in 1974. The largest is 6 cm long. (Private collection)

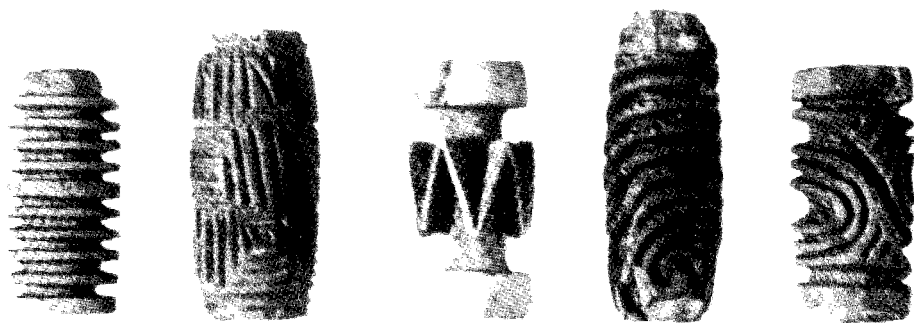


Plate II Five baked clay objects from Ban Chiang illustrating a broad range of shapes and designs. Note the barrel rather than parallel shape of these artifacts. The object at left is 5.5 cm long (Gorman and Charoenwongsa 1976:22, 23).

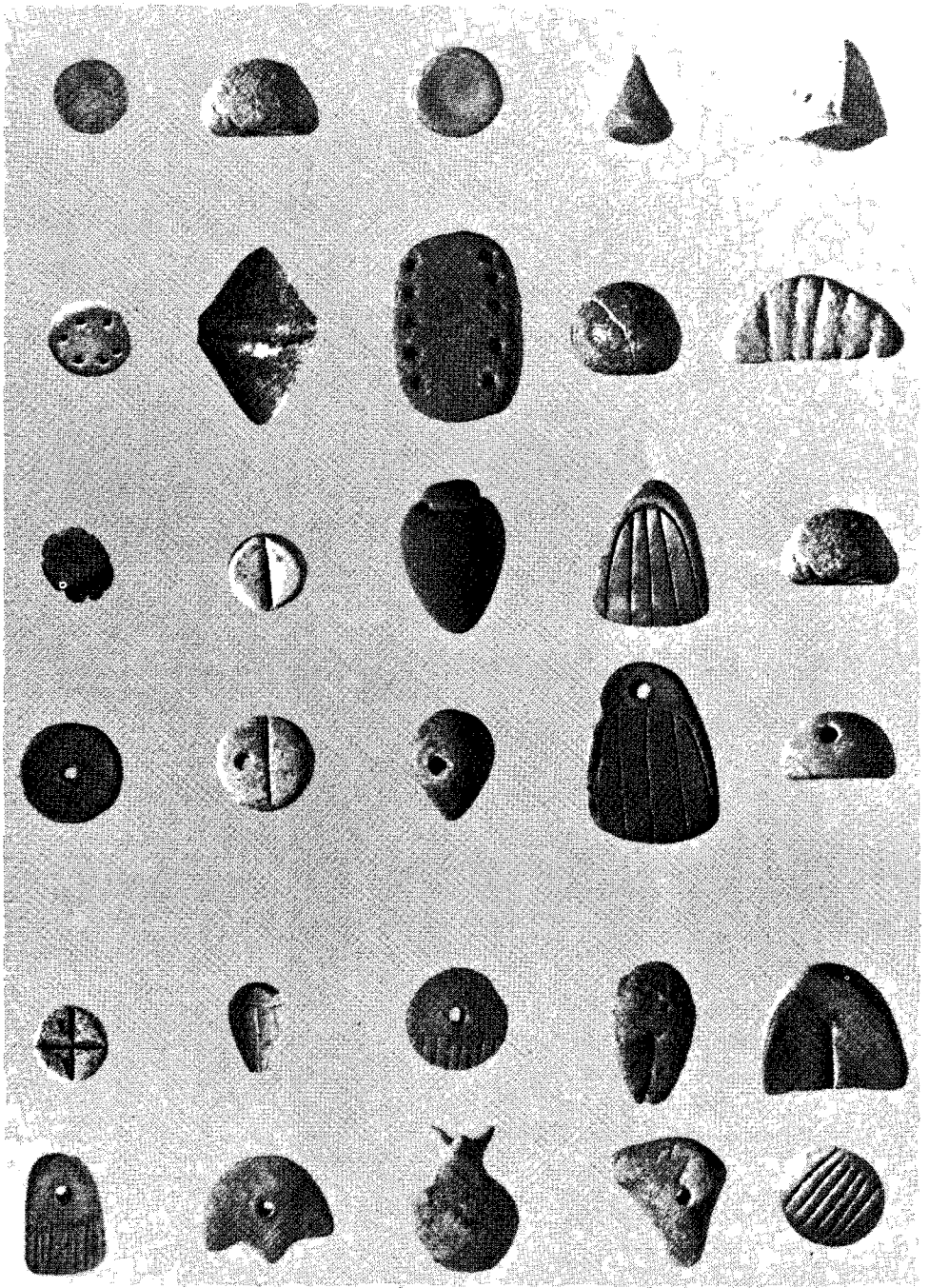


Plate III Baked clay objects from Iran and Syria (Schmandt-Besserat 1978).

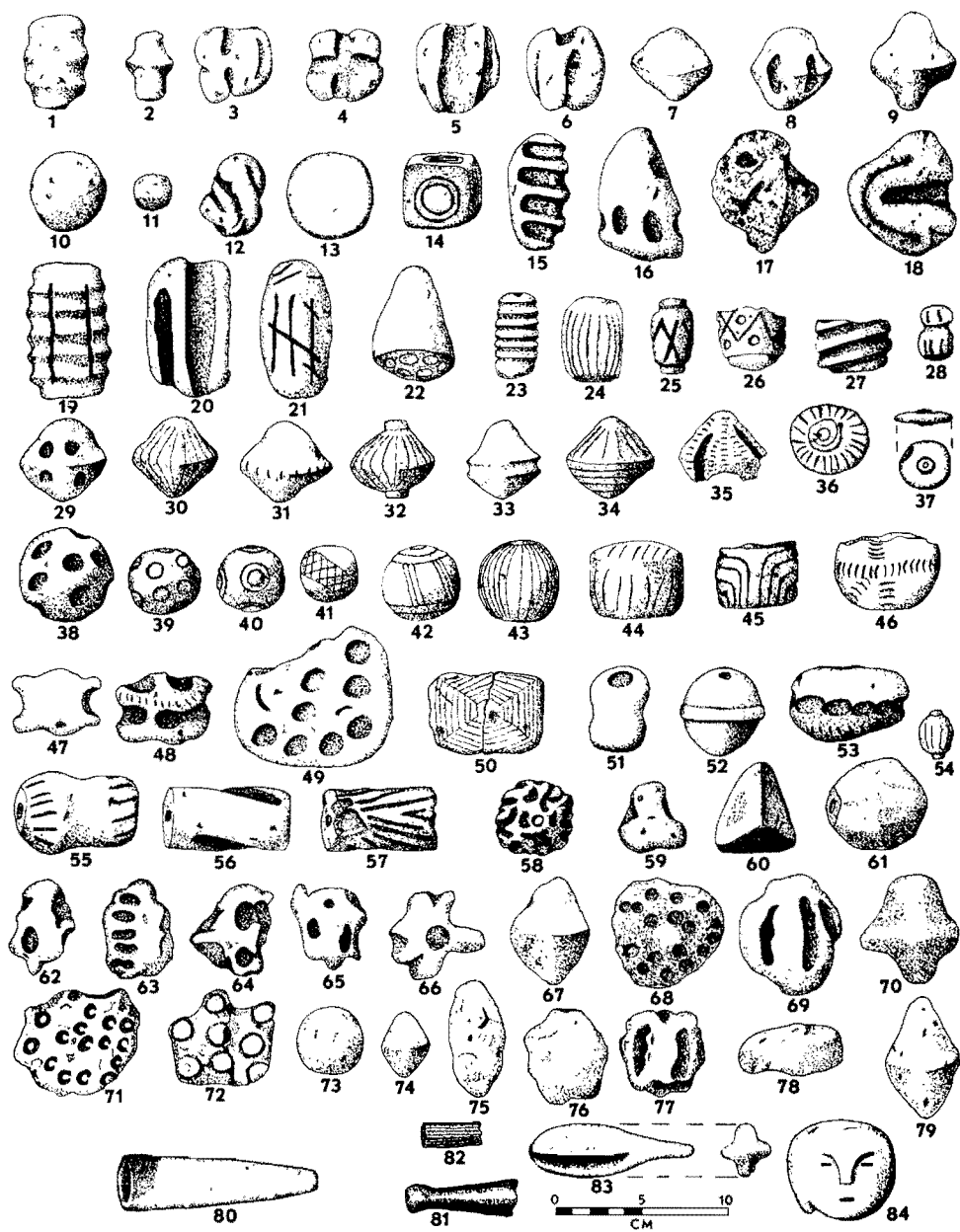


Figure 1 Baked clay objects from the southeastern United States (Webb 1977: Fig. 15).

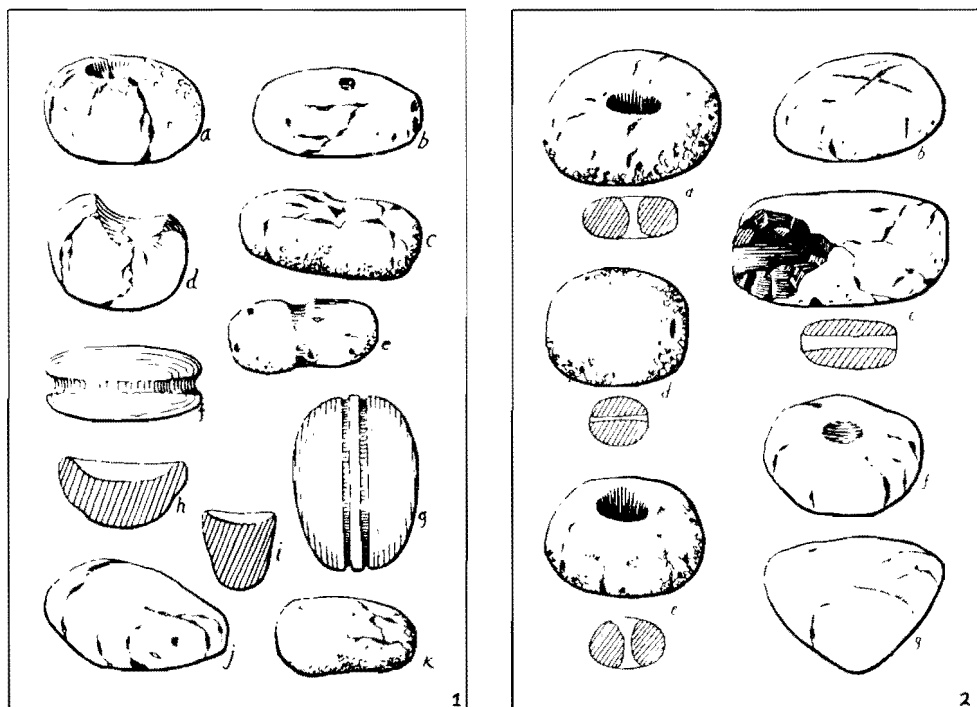


Figure 2 Baked clay objects from central California (Heizer 1937: Fig. 1).

have been made in sections with the disks shaped separately to be later assembled to form a cylinder.

In addition to the low and high relief surface features just described and illustrated, the Ban Chiang cylinders at times have a well-polished opening running the length of the artifact marked by shallow concentric grooves subsequently transected by axial striations (Donald Lewis, personal communication 1980) (Plate IV). Although several different explanations have been given for these openings, it is here suggested that the worn and enlarged edges at the ends indicate that they were used principally to string the objects together with a cord, as may have been the case with some Ban Chiang rollers associated with a Phase VI child's burial as illustrated by Gorman and Charoenwongsa (1976:24), rather than being carried on a fixed, metal shaft. Indeed, several seals were found at Nip-pur with remains of a string (Ward 1910:4, 5), suggesting that this was a fairly common method for wearing this class of artifact around the neck, wrist, or waist. Even though it cannot be stated categorically that the axial striations and polishing of the openings that extend for the length of the tokens in Plates I and IV were caused by a silken cord or some other linear device, it would seem that the concentric grooves were made during the production or later use of the objects while the axial striations were produced following their manufacture. Conversations with Gorman in 1980 suggest, however, that rollers he examined demonstrate axial striations followed by concentric grooves, opening the possibility that different types of rollers, perhaps from different periods, were not produced or

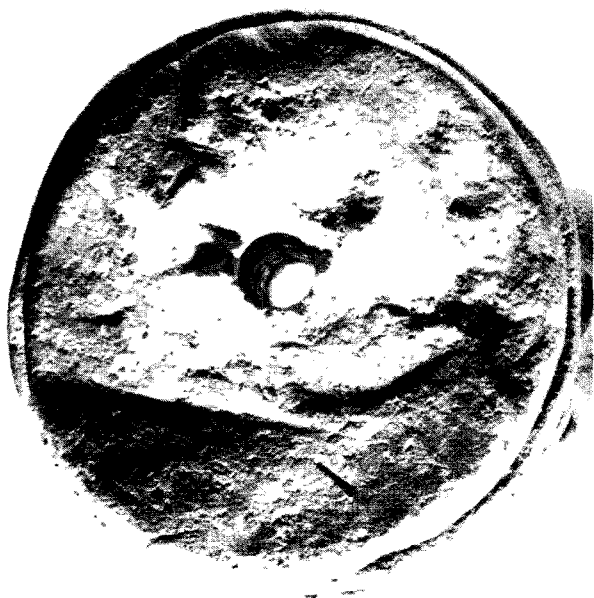


Plate IV Photograph showing concentric grooves and axial striations associated with the shaft of a Ban Chiang token.

used in the same manner. Indeed, the openings through some rollers are not centered in a few cases (Kanchanagama 1975:175), possibly suggesting that the finishing process had not been completed.

It has recently been discovered that several clay cylinders excavated from Ban Chiang by members of a University of Pennsylvania project (Gorman and Charoenwongsa 1976: 22-24) had been stained by red, blue, and ochre coloring that archaeologists have interpreted as material used by the Ban Chiang people in conjunction with the cylinders to decorate textiles. Moreover, what has been identified as a strand of silk thread recovered from one of these clay cylinders has prompted archaeologists further to infer that the cloth decorated was probably made of this typically Southeast Asian material.

Ostensibly, all of the clay cylinders from Ban Chiang and environs could have been used to decorate cloth in one way or another (Charoenwongsa 1973; Plate V; Van Esterik and Kress 1978; Kay Maxham, personal communication). But the question as to whether or not printed cloth existed in Ban Chiang during period IV times still remains open. Even though designs of any type could have been transferred with varying degrees of success directly onto cloth in conjunction with dyes or wax to produce positive or negative batik patterns, it must be kept in mind that the Ban Chiang people may not have printed but may have woven their designs into cloth. This is something the Fijians, for example,

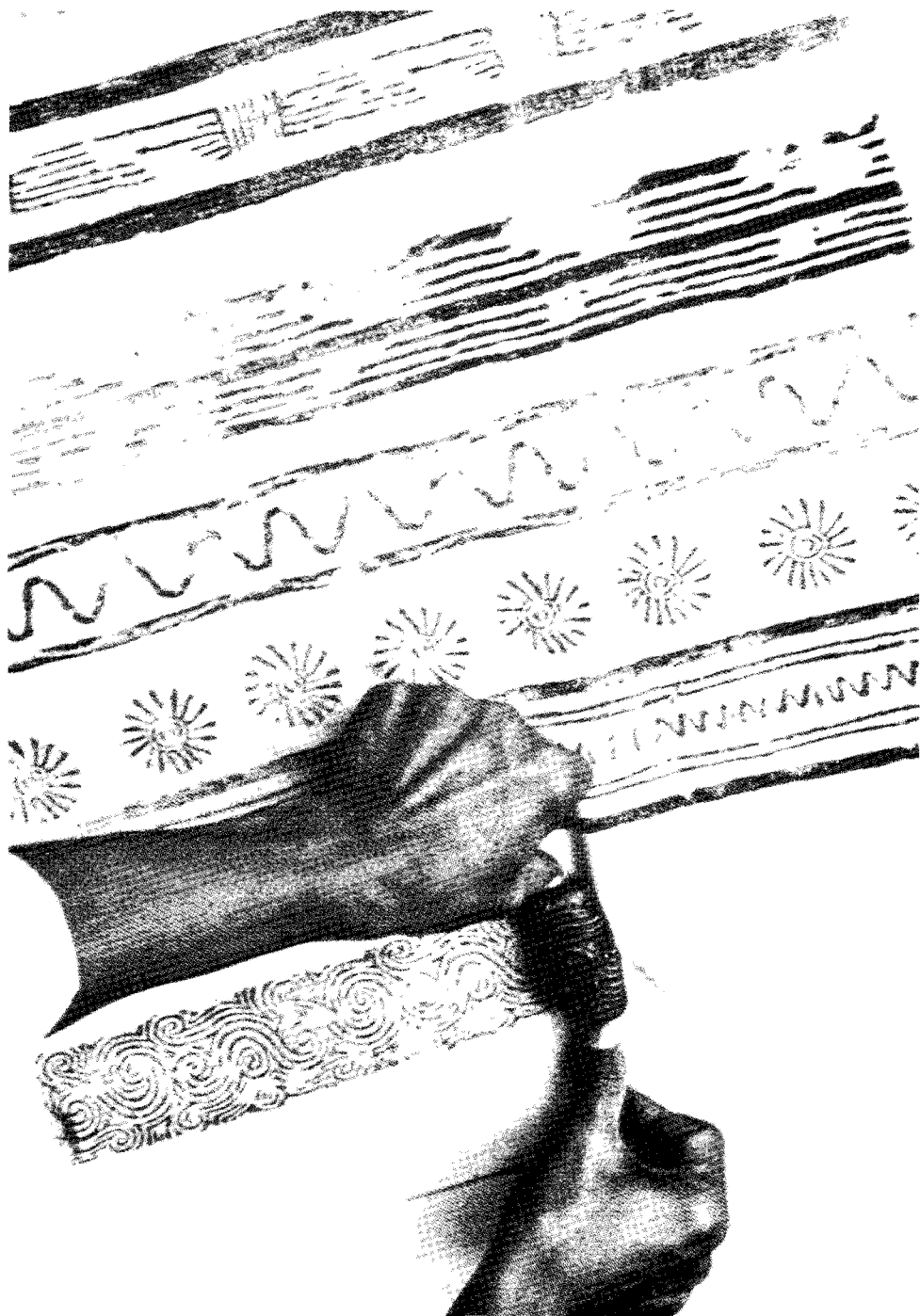


Plate V A demonstration of how baked clay objects from Ban Chiang and vicinity may have been used to decorate textiles using, in this case, high viscosity printer's ink (Charoenwongsa 1973: Fig. 8).

could not have done using tapa cloth, which can be decorated only by pounding or rubbing it over bamboo or other types of markers or tablets.

Furthermore, it may be noted that the convex shape of the Ban Chiang tokens does not suggest that they were either rolled or rubbed to produce a design. The uneven disks of the two rollers in Plate I, for example, do not make contact with a level surface at the same time, with the center disks being the highest of those making up the body of each roller. This would seem to indicate that if these rollers were used to decorate cloth or any flat surface directly, not all of the disks would have touched the same surface simultaneously, and only a few center disks would have done so during any given use. This could produce a somewhat uneven design like some of those illustrated by Charoenwongsa (1973; Plate V). Furthermore, if a cloth were placed over these rollers and rubbed to produce a design, Maxham (personal communication) is of the opinion that the rollers would develop parallel rather than convex sides like those illustrated by Kooijman from Fiji (1972: Figs. 329, 330). Moreover, if a roller were used to produce a design by pulling the cloth under a dye-soaked pad laid over the roller in a manner somewhat similar to that done in Fiji (Kooijman 1972:359-360; Van Esterik and Kress 1978:54, 55), there is no reason to believe that the rollers would have been produced with, or worn to assume, convex sides like virtually all of those from Ban Chiang. Additionally, if undyed cloth were laid over the rollers as described by Van Esterik and Kress (1978), the rollers would not be stained with dyes used during the printing process which would not, therefore, have colored the rollers like those from Ban Chiang (Gorman and Charoenwongsa 1976:22-24).

In reality, only perfect cylinders from Babylon and Persia have been considered suitable for imprinting anything except clay tablets (Ward 1910:2). Moreover, Ward goes on to state that in later periods the cylinders became convex or somewhat barrel-shaped, like those from Ban Chiang, so that only a small device would have been engraved in the center surface, leaving open the possibility that the seal had finally ended up being little more than an amulet at times worn as part of a ring (Ward 1910:2).

#### DISCUSSION

Work by Denise Schmandt-Besserat (1977, 1978) (Plate III) on clay objects from Iran and Syria (similar to the clay rollers from Ban Chiang) has indicated that these types of clay artifacts may represent ideographic tokens considered by her to be the precursors of early writing systems rather than pictographs as earlier suggested by I. J. Gelb (1969: 190). Stimulated by Schmandt-Besserat's work, Hyde and Folan (1980) have suggested that similar tokens from the early chieftain or incipient state level regional center of Poverty Point, Louisiana, of the Late Archaic Period (Fig. 1) in the southeastern United States and the Early to Late Horizon (Fig. 2) in California, previously thought to represent clay substitutes for cooking stones, also represent ideographic tokens (Folan and Hyde n.d.). In conjunction with this interpretation we also suggested that the development of ideographic tokens in these three examples appeared coeval with the onset of an optimum period that would have brought about an increase in the type and quantity of subsistence items available for intensive collection that, in turn, would have facilitated population growth due to the increase in resources. Furthermore, we thought that demographic expansion in the southeastern United States and California would have made conditions ideal for a shift from an egalitarian to a ranked, redistributational society which, according



to Schmandt-Besserat (personal communication, 1980), would have created the need for some type of recording system to keep track of the multiple transactions taking place within and outside the society.

#### CONCLUSIONS

Although we do not have the type of climatic data available for the Ban Chiang area that we have for the southeastern United States and California, we suggest, in general, that there occurred an increase in available moisture in the Ban Chiang area beginning around 1600 B.C. during a cooler, wetter period than had existed previously (Denton and Karlén 1973: Fig. 1). This climatic change seems to have been accompanied by a switch from swiddening to extensive-intensive swiddening in conjunction with a wet form of rice agriculture using a hydraulic system and water buffalos (Higham 1975:285-287; Higham 1979:674-679; Higham and Kijngam 1979:230-232), that must have increased productivity and therefore made possible a larger population aggregate. This, in turn, may well have set the scene for the development of a more complex level of sociocultural organization that would have made essential the development of an accounting system to keep track of exchanges including pottery, bronzes, iron, textiles, fish, and other items common to Ban Chiang c. 1600 B.C. and later.

Based on this argument, we suggest that the clay objects from Ban Chiang may represent tokens forming part of such an accounting system instead of having been used exclusively to decorate textiles. Furthermore, we suggest that the sizes, designs, and colors of the tokens represent different quantities of items, perhaps associated with people from various places. We also think it possible that the tokens could have been joined together to form statements regarding the content and source of a particular shipment, as in the case of the tokens in Iran (Schmandt-Besserat 1977:24). For example, the objects bearing incised designs included with metal tools encrusted with the remains of woven cloth found in Ban Chiang (Charoenwongsa 1973:30-31) may well represent ideographic tokens identifying the contents of a shipment or, perhaps, included as part of a tribute due Ban Chiang from a secondary center. (This may also explain how the clay token described above was discovered encrusted with a possible silk thread.) In this case the tokens could represent a certain quantity of various goods or commodities, such as measures of rice or other such items.

When taking all of the above into consideration, it would seem that Pisit Charoenwongsa's (1973:31) and Van Esterik and Kress's (1978) prudence in assigning a definite use and function to the so-called Ban Chiang rollers was not without merit. We believe it is possible that the earliest precursor to writing in Southeast Asia was not pictographs but clay tokens developed in Ban Chiang. Here people undergoing a population increase and a shift from a tribal to at least a chiefdom level of sociocultural integration may have found a problem and a solution similar to those of peoples in other areas of the world.

#### ACKNOWLEDGMENTS

We would like to thank Wilhelm Solheim II, Penelope Van Esterik, and Nancy Kress for enabling us to improve this manuscript. All errors or omissions are, however, exclusively those of the authors.

We would also like to acknowledge and thank the people of the Office of Instructional Services, UTSA for their help with this and other projects.

## REFERENCES

CHAROENWONGSA, PISIT

1973 *Ban Chiang*. Bangkok: Pikanet Press.

DENTON, GEORGE, and WIDJORN KARLÉN

1973 Holocene climatic variations: Their pattern and possible cause. *Quaternary Research* 3:155-205.

FOLAN, WILLIAM J., and BURMA H. HYDE

n.d. The significance of Early to Late Horizon Period baked clay objects of the lower Sacramento and the San Joaquin Valley, California. Manuscript submitted for publication.

GELB, I. J.

1969 *A Study of Writing*. Chicago and London: University of Chicago Press.

GORMAN, C. F., and PISIT CHAROENWONGSA

1976 Ban Chiang: A mosaic of impressions from the first two years. *Expedition* 18:14-26.

HIGHAM, CHARLES F. W.

1975 Aspects of economy and ritual in prehistoric Northeast Thailand. *Journal of Archaeological Science* 2:245-288.

1979 The economic basis of prehistoric Thailand. *American Scientist* 67:670-679.

HIGHAM, CHARLES, and AMPHAN KIJNGAM

1979 Ban Chiang and Northeast Thailand; the palaeoenvironment and economy. *Journal of Archaeological Science* 6:211-233.

HYDE, BURMA H., and WILLIAM J. FOLAN

1980 The dawn of writing in the New World: Tokens and trade in Poverty Point, Louisiana and related sites. *Louisiana Archaeologist* 7:67-82.

KANCHANAGAMA, PREECHA

1972 Terra-cotta rollers from Ban Chiang. *Archaeology* 4(2):174-178. Bangkok.

KOOIJMAN, SIMON

1972 *Tapa in Polynesia*. Bernice P. Bishop Museum Bulletin no. 234. Honolulu.

MANSUY, H.

1902 *Stations Préhistoriques de Samron-Seng et de Longprao (Cambodge)*. Hanoi: F. H. Schneider.

SCHMANDT-BESSERAT, DENISE

1977 An archaic recording system and the origin of writing. *Syro-Mesopotamian Studies* 1(2):31-70.

1978 The earliest precursor of writing. *SA* 238(6):50-59.

VAN ESTERIK, PENELOPE, and NANCY KRESS

1978 An interpretation of the Ban Chiang rollers: Experiment and speculation. *AP* 21:52-57.

WARD, W. H.

1910 *The Cylinder Seals of Western Asia*. Philadelphia: Lippincott Press.

WEBB, CLARENCE

1977 *The Poverty Point Culture*. Geoscience and Man, Vol. 17. Baton Rouge: School of Geoscience, Louisiana State University.